

IN THE CLAIMS

Please **amend** claims 1 and 39 and **cancel** claim 36 without prejudice as shown in the Status of the Claims, infra. Additions are underlined and deletions are struck through.

Amendment to claim 39 is to correct a typographic error and not for reasons of patentability. Amendment to claim 1 is made without the intention of surrendering the equivalents that would otherwise have been available to claim 36, which was objected to but allowable.

STATUS OF THE CLAIMS

Claim 1 (currently amended)

1. (Twice Amended) A cleaning apparatus comprising:  
scrubbing means for scrubbing a first surface of an object to be cleaned; and  
ultrasonic wave projection means for supplying an aqueous cleaning agent  
against a second surface of the object to be cleaned and generating an ultrasonic  
wave,

wherein the first surface and the second surface are disposed on opposing sides  
of the object to be cleaned so that the object to be cleaned is between said scrubbing  
means and said ultrasonic wave projection means, so that the scrubbing means is in  
registration with the first surface of the object to be cleaned and the ultrasonic wave  
projection means is in registration with the second surface of the object to be  
cleaned[;].

wherein the first surface of the object to be cleaned is simultaneously cleaned  
by the scrubbing means and by the ultrasonic wave generated by the ultrasonic wave  
projection means that has propagated from the first surface, through the object to be  
cleaned to the second surface.

Claims 2-9 (original)

2. The cleaning apparatus as set forth in claim 1, further comprising:  
cleaning agent supply means for supplying an aqueous cleaning agent onto the  
first surface of the object to be cleaned.
3. The cleaning apparatus as set forth in claim 1, further comprising:  
transport means for transporting the object to be cleaned.
4. The cleaning apparatus as set forth in claim 1, wherein:  
said scrubbing means is a cleaning brush.

5. The cleaning apparatus as set forth in claim 4, wherein:  
said cleaning brush is a roll brush.
6. The cleaning apparatus as set forth in claim 4, wherein:  
said cleaning brush is a disk brush.
7. The cleaning apparatus as set forth in claim 1, wherein:  
said ultrasonic wave projection means is an ultrasonic nozzle for blowing the  
cleaning agent and generating an ultrasonic wave.
8. The cleaning apparatus as set forth in claim 2, wherein:  
said cleaning agent supply means is a spray for radially spraying the aqueous  
cleaning agent.
9. The cleaning apparatus as set forth in claim 1, wherein:  
said ultrasonic wave is megasonic in a frequency band within a range of from  
850 kHz to 1 MHz.

Claims 10 and 11 (previously presented)

10. (Amended) The cleaning apparatus as set forth in claim 1, wherein:  
said aqueous cleaning agent is at least one of pure water, superpure water,  
hydrogen water, ozone water, dilute hydrofluoric acid, and aqueous surface active  
agent.
11. (Twice Amended) The cleaning apparatus as set forth in claim 3,  
wherein:  
said transport means is transport rollers.

Claim 12 (original)

12. The cleaning apparatus as set forth in claim 3, wherein:

said transport means is a belt conveyer.

Claims 13-35 (previously withdrawn)

13. The cleaning apparatus as set forth in claim 1, further comprising:  
a reverse mechanism for turning over the object to be cleaned.
14. The cleaning apparatus as set forth in claim 1, further comprising:  
a rotation mechanism for rotating the object to be cleaned.
15. The cleaning apparatus as set forth in claim 14, wherein:  
said rotation mechanism rotates the object to be cleaned about a rotation axis  
vertical to the object while supporting its peripheral portion.
16. A cleaning apparatus, comprising:  
cleaning agent jet-spray means for jet-spraying an aqueous cleaning agent  
against a surface of an object to be cleaned under high pressure; and  
ultrasonic wave projection means for supplying the cleaning agent to the  
surface of the object to be cleaned and generating an ultrasonic wave,  
wherein said cleaning agent jet-spray means and said ultrasonic wave  
projection means are disposed so as to face one another, and  
the object to be cleaned is to be set between said cleaning agent jet-spray  
means and said ultrasonic wave projection means.
17. The cleaning apparatus as set forth in claim 16, further comprising:  
transport means for transporting the object to be cleaned.
18. The cleaning apparatus as set forth in claim 17, wherein:  
said transport means is transport rollers.
19. The cleaning apparatus as set forth in claim 17, wherein:  
said transport means is a belt conveyer.

20. The cleaning apparatus as set forth in claim 16, wherein:  
said cleaning agent spray means is a high pressure spray nozzle.
21. The cleaning apparatus as set forth in claim 16, wherein:  
said ultrasonic wave projection means is an ultrasonic nozzle for blowing the cleaning agent and generating an ultrasonic wave.
22. The cleaning apparatus as set forth in claim 16, wherein:  
said ultrasonic wave is megasonic in a frequency band within a range of from 850 kHz to 1 MHz.
23. The cleaning apparatus as set forth in claim 16, wherein  
said aqueous cleaning agent is pure water, superpure water, hydrogen water, ozone water, dilute hydrofluoric acid, or aqueous surface active agent.
24. The cleaning apparatus as set forth in claim 16, further comprising:  
a reverse mechanism for turning over the object to be cleaned.
25. The cleaning apparatus as set forth in claim 16, further comprising:  
a rotation mechanism for rotating the object to be cleaned.
26. The cleaning apparatus as set forth in claim 25, wherein:  
said rotation mechanism rotates the object to be cleaned about a rotation axis vertical to the object while supporting its peripheral portion.
27. A cleaning method, comprising the step of: supplying an aqueous cleaning agent to a surface of an object to be cleaned; and  
propagating ultrasonic to the object to be cleaned from its back surface,  
whereby the surface of the object to be cleaned is ultrasonically cleaned.
28. The cleaning method as set forth in claim 27, further comprising the step of:

scrubbing the surface of the object to be cleaned by scrubbing means,  
wherein said scrubbing step and said ultrasonic cleaning step are performed  
simultaneously.

29. The cleaning method as set forth in claim 27, further comprising the step of:  
transporting the object to be cleaned.

30. The cleaning method as set forth in claim 27, wherein:  
said ultrasonic cleaning process is performed by applying the aqueous cleaning  
solution having applied thereto ultrasonic wave to a back surface of the object to be  
cleaned.

31. The cleaning method as set forth in claim 28, further composing the step of:  
cleaning said scrubbing means by applying thereto an aqueous cleaning agent  
having applied thereto ultrasonic wave, said scrubbing means cleaning step being  
performed in a state where the object to be cleaned is not set.

32. The cleaning method as set forth in claim 28, wherein:  
said scrubbing means is a cleaning brush.

33. A cleaning method, characterized by comprising the steps of:  
transporting an object to be cleaned to be set between scrubbing means and  
ultrasonic wave projection means;  
supplying an aqueous cleaning agent to a surface of the object to be cleaned on  
the side of said scrubbing means;  
scrubbing the surface of the object to be cleaned by said scrubbing means;  
ultrasonic-cleaning the surface of the object to be cleaned by applying the  
aqueous cleaning agent having applied thereto an ultrasonic wave by said ultrasonic  
wave projection means to its back surface and propagating ultrasonic wave to the  
object to be cleaned;  
transporting said object to be cleaned out from a spacing between said  
scrubbing means and said ultrasonic cleaning means; and

cleaning said scrubbing means by applying thereto the aqueous cleaning agent having applied thereto the  
ultrasonic wave by said ultrasonic wave projection means,  
wherein said step of cleaning said scrubbing means is performed in a state where the object to be cleaned is not set.

34. The cleaning method as set forth in claim 33, wherein:  
said step of scrubbing the surface of the object to be cleaned by said scrubbing means and said ultrasonic cleaning step are performed simultaneously.

35. The cleaning method as set forth in claim 33, wherein:  
a plurality of said object to be cleaned are transported in and out successively.

Claim 36 (canceled)

Claims 37 and 38 (original)

37. The cleaning apparatus as set forth in claim 1, further comprising:  
a reverse mechanism for turning over the object to be cleaned.

38. The cleaning apparatus as set forth in claim 1, further comprising:  
a rotation mechanism for rotating the object to be cleaned.

Claim 39 (currently amended)

39. (Amended) The cleaning apparatus as set forth in claim 38, wherein:  
said rotation mechanism rotates the object to be cleaned about a rotation axis vertical to the ~~object~~ object while supporting its peripheral portion.

Claims 40 – 52 (previously presented)

40. A cleaning apparatus comprising:

scrubbing means for scrubbing a first surface of an object to be cleaned; and  
ultrasonic wave projection means for supplying an aqueous cleaning agent  
against a second surface of the object to be cleaned and generating an ultrasonic  
wave,

wherein the first surface and the second surface are disposed on opposing sides  
of the object to be cleaned so that the object to be cleaned is between said scrubbing  
means and said ultrasonic wave projection means, so that the scrubbing means is in  
registration with the first surface of the object to be cleaned and the ultrasonic wave  
projection means is in registration with the second surface of the object to be cleaned;  
and

wherein the object to be cleaned is not immersed or submerged in a cleaning  
solution.

41. The cleaning apparatus as set forth in claim 40, wherein

the first surface of the object to be cleaned is simultaneously cleaned by the  
scrubbing means and by the ultrasonic wave generated by the ultrasonic wave  
projection means that has propagated from the first surface, through the object to be  
cleaned to the second surface.

42. The cleaning apparatus as set forth in claim 40, further comprising:

cleaning agent supply means for supplying an aqueous cleaning agent onto the  
first surface of the object to be cleaned.

43. The cleaning apparatus as set forth in claim 40, further comprising:

transport means for transporting the object to be cleaned.

44. The cleaning apparatus as set forth in claim 40, wherein:

said scrubbing means is a cleaning brush.



45. The cleaning apparatus as set forth in claim 44, wherein:  
said cleaning brush is a roll brush.
46. The cleaning apparatus as set forth in claim 44, wherein:  
said cleaning brush is a disk brush.
47. The cleaning apparatus as set forth in claim 40, wherein:  
said ultrasonic wave projection means is an ultrasonic nozzle for blowing the  
cleaning agent and generating an ultrasonic wave.
48. The cleaning apparatus as set forth in claim 40, wherein:  
said cleaning agent supply means is a spray for radially spraying the aqueous  
cleaning agent.
49. The cleaning apparatus as set forth in claim 40, wherein:  
said ultrasonic wave is megasonic in a frequency band within a range of from  
850 kHz to 1 MHz.
50. The cleaning apparatus as set forth in claim 40, wherein:  
said aqueous cleaning agent is at least one of pure water, superpure water,  
hydrogen water, ozone water, dilute hydrofluoric acid, and aqueous surface active  
agent.
51. The cleaning apparatus as set forth in claim 43, wherein:  
said transport means is transport rollers.
52. The cleaning apparatus as set forth in claim 43, wherein:  
said transport means is a belt conveyor.